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The Preservation and Care of Food.

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THE PRESERVATION AND CARE OF FOOD

There was a story, no doubt you remember it, in one of the old school Royal Readers, of a pudding that it took more than a thousand men to prepare, and of a small boy who was very much disappointed and very incredulous when he was shown the pudding and it proved to be a plum pudding of the ordinary size. Later he was treated to a further surprise when someone pointed out to him that in the production of the flour, raisins, suet, spices, etc., that the pudding contained, of the metal or earthenware in dishes used for mixing and cooking, and in the transportation of some of these things from foreign lands, in the displaying and caring for, and selling and delivering of them by the merchant, there was a possibility of thousands of persons having had a share in the making of a very ordinary pudding.

The truth thus brought home to this small boy is of increasing significance today.

TRANSPORTATION OF FOOD MATERIALS.

Many of the materials that enter into our food preparation are products of people and lands very remote. From the ends of the earth come fruits, fresh and dried, tea, coffee, cocoa, sugar, molasses. The islands of the sea send us spices and nuts and flavorings. Recently when our demand for eggs and butter was greater than the supply, things were equalized by importations from China of eggs and from New Zealand of butter. Even in the markets of Sussex and Moncton and St. John, Western beef is a fami commodity. The oysters and lobsters of Maritime Province shores ave travelled much farther than many of us have or will. At the Paris Exposition in 1904 milk and cream were exhibited in a perfectly fresh and sweet condition after having travelled from the United States to France, a journey of ten days.

The reasons that such perishable goods can be carried such distances in a good state of preservation are:

(1) The modern rapid means of transportation by water or rail.
(2) The knowledge of the causes of decay and means of preservation.
(3) The modern facilities for storing and packing foods.

CAUSES OF PUTREFACTION.

Of the last two of these at least, the housewives of the world should have some knowledge of a practical order, so that they may be able intelligently to care for and store food after it reaches the home.

The cause of putrefaction or decay of organic matter, whether vegetable or animal, is the presence in it of tiny organisms to which the names yeast, mold or bacteria are applied. Of these, bacteria are the most numerous and the most fruitful of decay. It is only very recently that very much has been known about these tiny plants.

They are so small that six hundred millions of them would occupy the same amount of space as a grain of sugar and not crowd one another. The individual bacterium can only be seen by the aid of a powerful microscope, this being the reason why these small plants remained in the realm of the unseen and unknown until about two hundred years ago, when a Dutch lens grinder in 1675 saw through one of his lenses in a drop of stagnant water, moving forms, his friends scoffed at his story, and intimated that he was not wholly sane.

BACTERIA THE CAUSE OF DISEASE.

The foundations of the science of Bacteriology were laid by Louis Pasteur, a Frenchman, when about sixty-five years ago, he began to cultivate and experiment with these tiny organisms. He established the proof that bacteria reproduce as other plants, that they cause certain diseases, and that the souring of milk is due to the action of certain bacteria.

Pasteur will perhaps be longest remembered for his contribution to medical science of a treatment and cure for rabies or hydrophobia. His foundation work in bacteriology was built upon by Robert Koch, about twenty years after. To him we owe the perfection and absolute proof that bacteria are the cause and not the effect of disease. He made a specialty of the culture of disease germs, of the study of their actions and of the means of absolutely recognizing the bacteria that cause any particular disease.

FOOD-DESTROYING BACTERIA.

It is not of the pathogenic or disease-producing bacteria that we speak, when we mention these plants in relation to the decay of food. There are many, many varieties of these interesting little organisms which act only upon dead organic matter, while the disease-causing varieties act upon living organisms as well.

All have certain characteristics in common, however. All are very tiny. All reproduce with amazing rapidity, chiefly by fission, that is by breaking into two or three or four new bacterium. In one day a single bacterium may have a progeny of sixteen million. In five days, it is estimated that enough would be produced to make the ocean solid. This is of course with the supposition that all live. As a matter of fact only a small number (comparatively speaking) live, because they produce by their growth in any substance self-destructive poisons, and beside that, each tribe or variety has many enemies in other tribes of bacteria. They all "love darkness rather than light" probably for the same reason that some animals higher up in the scale of creation, show the same tendency. They all need air, moisture, warmth and food. Intense heat is fatal to all bacteria and any temperature below 40° F. reduces them to a state of torpor, but freezing will not kill many of them. Speaking of the ancient beginnings of bacteria, S. W. Gililan, of Chatauqua, has expressed the truth in what he claims is the shortest poem ever written. It reads

"Adam
Had 'em."

SOME BACTERIA DESIRABLE.

As to food, the decay-producing bacteria will thrive on any moist plant or animal matter. Bacteriologists have found that beef tea, milk, gelatine jelly, cold cooked potato are specially good media for their growth. It is by no means true that all bacteria are harmful. Many of them aid materially in the industries. For instance, you no doubt know how essential to the flavor of cheese and butter is the action of certain bacteria. The flesh of animals is not at its best for food purposes, until the butcher has allowed it to hang for some days, during which it is undergoing a change due to bacterial action.

In the manufacture of linen, of leather, of tobacco, of vinegar, bacteria play an important role. The souring of cream, which makes butter a possibility, could not take place if there were no lactic acid bacteria. It is interesting to know that the same bacteria which give rise to the desired flavor of cheese, butter and meat, will, if their action is not checked by some means, give rise to undesired flavors and unwholesome acids in the same foods.

GROWTH OF YEASTS.

Of yeasts, another form of minute vegetable life which live on and produce change in organic matter, it may be said that each plant is a giant in size compared with the smallest bacterium, yet the individual plants are not visible to the naked eye and it takes two thousand of them to measure an inch. They reproduce by a process called budding. Yeast grows best in a warm, sweet liquid left open to the air. It feeds upon the sugar changing it to alcohol and carbonic acid gas. Cooked fruits and fruit juices are especially susceptible to the action of yeast. The first visible symptom of their presence is the working or fermentation of the liquid and the bubbles of gas escaping or rising. Of yeasts as of bacteria, we have some good to say. While they spoil many of our foods, we cannot forget that one variety of yeast makes possible *bread*, the very staff of life, and *alcohol*, a much misused but, for many purposes, a very desirable article of commerce.

UNDERDONE BREAD SOURS.

It may be interesting to you to know that if bread is not thoroughly cooked and the action of the yeast thus stopped, it will continue after cooking and cause the bread to sour. In a laboratory where experiments were being conducted, some new bread was started from yeast plants found in the centre of an underdone loaf. The yeast which we use for bread-making may be called a domesticated variety of a yeast once growing wild. You have probably read or heard of the days when the moistened flour was exposed to the air until it showed symptoms of the presence of yeast. Bread made by such a process was often ill-tasting, because of the action in it of undesirable yeasts and bacteria which entered it during its exposure to the air.

HARMFUL EFFECT OF MOLDS.

The other form of microscopic life which is known to be a spoiler of our food, is *mold*. In appearance the colonies of mold are much more plant like than either bacteria or yeast. They reproduce in the same manner as mushrooms and mosses, that is, by spores. Molds grow with less moisture than bacteria, and some of them flourish in the light. They take many beautiful fern like forms in growing, visible, however, only by the aid of a microscope. A musty smell is one of the first symptoms of the presence of growing mold plants. Cheese, flour, bread, vegetables and fruits, are the foods most often attacked. Molds will also grow on wood, cloth or leather. Ringworm is a disease caused by a variety of mold. Molds seem to have almost no use in the preparation of foods, as have bacteria and yeast, unless we might mention the Limburger cheese which our German friends would think very flat without its mold, or the Chinese "say" made from a bean upon which mold has grown.

ALL DUST CONTAINS BACTERIA.

Bacteria, molds and yeasts have this in common, that they may all be found in ordinary *dust*, and it is usually in the form of dust that they reach our food. Dust you know is the dirtiest substance on earth. It is made up of such things as ashes, fine sand, bits of dead animal and vegetable matter, dried sputum, bits of wool or hair, particles of cast-off skin and other such horrors. Certainly we want none of these in our food. But in dust the gravest menace to food lies in the living things present, the yeasts, the molds, the bacteria. The following report of an experiment may impress you with the gravity of this dust danger to food.

A dish of absolutely sterile (that is free from any mold or yeast or bacteria) gelatine jelly was exposed for twenty minutes to the air in an ordinary room, then covered tightly with a glass slide and set for two days in a room with temperature of 70° F. It was then found to be covered with spots of various sizes, colors and shapes, which were nothing more or less than some twenty or thirty different colonies of yeasts, molds or bacteria. These were left undisturbed for a week, then the cover was gently raised, when the strong and unmistakable odor of putrefaction greeted the nostrils. The next time you are tempted to leave a piece of meat, or a bowl of jelly, or a pitcher of milk uncovered in your kitchen, remember this true story and cover each with a cloth to keep out the dust.

DANGERS IN DUST.

It is said that the number of bacteria in the air varies directly as the population. Certain it is that only in the polar regions in mid-ocean and on the tops of high mountains, is the air free from them. Dr. Prudden in "Dust and its dangers" gives the results of attempts to count the bacteria in the dust of a city's streets. Jelly covered plates 3½ inches in diameter, were exposed for five minutes in several places, with the result of 214 bacteria collected in one place, 199

collected in a large store and 5,810 collected on the streets when they were being swept. Wherever there are many people or wherever many things or persons are kept moving, there is much dust in the air and therefore many bacteria. How should this affect our attitude toward fruit, fish, meat and vegetables, often exhibited outside grocery stores or markets? Should we not be most careful not to have our meat hanging in our storerooms without being cloth-covered, and will you now feel quite the same about leaving a lemon pie or even a pan of fudge out doors to cool? Beside the actual filth, too disgusting to be even thought of, there is in dust disease-producing and death-dealing micro-organisms. "The day of small things" is at hand and we cannot afford to "despise" it.

UNCLEAN HANDLING OF FOOD.

Someone has said that heaven mercifully keeps from us too close a knowledge of the recent surroundings and past experiences of the food we have to eat. Stuff and nonsense! We want to know all about the antecedents of what is to become part of us, so that if all is not well with it, we may study to set corrective forces into operation. Ignorance only in this regard is a more dangerous thing than even "a little knowledge." We do not wish to be in the same class with the savage who, when an English traveller showed him by means of a powerful magnifying glass, the real live condition of the putrid food he was eating, broke the glass and continued to eat the fruit. Only ignorance could possibly excuse or tolerate the fearful carelessness sometimes exhibited in the handling of food in the store and on the delivery team, and yes, in the home sometimes, too. I have seen butter come from the store with a black edge from contact with a dirty knife, and wrapped only in brown paper. I have seen the same grocer sweep his store (semi-occasionally only) without covering fruit or other exposed food. The dirty hands and untidy persons of some grocers and market and delivery men, might fairly make us seasick, and yet we put up with these things and accept them as necessary evils. It is the housewife's fault that there are unclean markets and grocery stores and careless handling of food. If all the women who patronize a store would put a premium upon cleanliness, showing a willingness to even pay a little more for food of clean surroundings and clean handling, they would get it. It costs time and energy and therefore money to keep things clean, but men would do it rather than lose the patronage which means a living to them. No doubt it is often mere thoughtlessness, often of boys, who are said to hate water, and conditions would be gladly changed if attention were called to the fault.

The recent scandal of the meat packing plants of the United States was an eye-opener to many, and the subsequent legislation and rigid inspection of places where food is canned or packed or prepared in any way, is doing much for the cause of clean and hygienic food, but a knowledge of the actual conditions under which the food is handled, and a strong public sentiment against anything suspicious in its antecedents or environment, are the only things that will raise the standard of prepared foods to the highest level.

TAINTED MILK.

Milk is one of the most easily tainted of foods, yet I wonder how many persons are careful to have clean hands and wear clean clothes while milking the cows, and separating the milk. I heard of one milkman who when delivering milk sometimes covered one of the cans with his hat. A right but misdirected spirit was shown, for was he not evidently willing to sacrifice himself for the protecting of the milk?

The care of the dishes in which milk is kept is no simple matter. Scalding water and sunshine aplenty and a good airing away from dust are necessary after every time of use, as you know. If milk is delivered to you in bottle or can, be sure to wipe the edge of the dish well before pouring out its contents. You do not know in what condition the hands of the milkman were, so be on the safe side. The stringiness and discoloration sometimes noticed in milk are the result of bacteria coming from hands, clothing or hair of the milker, or perhaps from dust off the cow's hair. Such milk is of course unfit for use.

"A LITTLE KNOWLEDGE A DANGEROUS THING."

In the matter of insisting upon clean and carefully handled foods, the housewife must have facts to prove her case before she can convict manufacturer or grocer or hope to better conditions, and much harm may be done the reputation of innocent persons and really good food. Sausage, in any form, is repulsive to a person of my acquaintance, merely because of harrowing and (let us hope) untrue tales of its constituents, heard during her childhood. Now we all know that there are some clean and excellent foods sold under the name of sausage. Gelatine jelly is not even spoken of now in a certain home where one day a grown up son refused it, and told a stomach-rending tale of the horrors that entered into its manufacture. A clear case of a little knowledge being a dangerous thing, for if he had pursued the subject a little further he would have found that the gelatine is in its manufacture subjected to purifying and clarifying processes which render it much more clean than many foods with an unstained reputation.

IMPURE WATER CAUSES DISEASE.

The water used for drinking and cooking purposes in our homes should measure up to a very high standard of purity. It is a very common thing for impure water, bacterially speaking, to appear pure. How can water be pure coming from a well, perhaps twenty or thirty feet deep, situated near the house and perhaps nearer the barn, and often on a lower level than either. Drainage from the barn and house waste pipe cannot but contaminate the water. The artesian well and all the modern methods of conveying water from a distance, as well as the fact that this is a land of overflowing pure springs, make a supply of pure water a possibility in any home in country or town. Probably the greatest danger from a questionable water supply, outside of the disgusting idea of drinking filth, is that of typhoid fever.

To the milk or water used by the victim, is most often traced the typhoid fever bacilli that are causing his illness. Suspected water is rendered safe by boiling for one-half hour.

PURE ICE NECESSARY.

A word here about the source and handling of the ice used in the kitchen, would not be out of place. Remember that even freezing temperatures do not destroy disease or decay-producing bacteria, so ice should be harvested only from places where the water was pure. Ice cut late in the season after a thaw and a second freezing is apt to be impure, because of the surface water washed down and frozen on top of the ice already there. Dirt from the horses' feet or the boots, hands and clothing of the iceman, or the use of water not clean for washing the ice before putting it in the ice box, should be safeguarded against.

Before we put ice in lemonade or water or punch we should be perfectly sure of the cleanliness of its source.

FLIES A MENACE TO HEALTH.

Now I have mentioned dust as a possible conveyor of contamination in the shape of bacteria and filth to our food. There is another very active agent in the distribution of bacteria and dirt. I speak of the common house fly, sometimes known as the "typhoid fly" from its known ability to spread that disease by carrying of the germs from one place to another. The poor fly hasn't a shred of reputation left. Health officers, physicians and housekeepers, vie with each other in the defamation of its character, and the worst of it is what they say is true. The breeding place and favorite haunt of flies is filth of all kinds, especially the excreta of animals. Here it lays its eggs and spends part of its leisure. The rest of its time is spent in rather too close association with human beings and their food. It is disgusting, but true, that the fly often comes direct from its filthy hatching place to walk over meat, to drop into milk or get entangled in butter, with its feet often bearing disease germs, and always that which one would scarcely care to eat. Do you wonder that the spreading abroad of such knowledge as this has resulted in a slogan "Swat the Fly" heard all over our land. The revelations of modern science have but increased the age-old enmity between thrifty housekeepers, on the one side, and flies and dirt, on the other.

MORE FLIES IN THE COUNTRY.

In the country there are very often more flies than in city houses because the barnyard furnishes an excellent place for them to breed. More sanitary conditions of the outbuildings and fewer exposed piles of manure will be absolutely necessary before the fly nuisance can be lessened. Kerosene oil poured over refuse and into drains will kill the eggs and drive away flies. In houses and outbuildings connected with the house, the use of screens and the relentless killing of all flies which gain an entrance are the only ways to protect the

food against their ravages, for you know how persistent they are. The best method of killing the flies is by placing about the room in shallow dishes a mixture of skim milk and formalin, in the proportion of ten to one. Formalin may be procured at the drug store for fifty cents a quart. It is very poisonous to children as well as flies, so should be handled accordingly. April is the time to start in if you really wish to have few flies this summer. Dr. Howard in his book "The House Fly" gives the following staggering report of the prolific reproducing abilities of the fly. He says that each fly lays at least 120 eggs, usually four times that number. But assuming that each lays 120 eggs, a single fly may from April 15 to September 10 be responsible for seven generations (the eggs hatch in two to three days) of flies, the total number of which, if all lived, would be 5,693,613,-559,320.

You can see then how important it is to kill every one of those now beginning to come to life after a winter spent in a state of torpor. Kill them by fair means or by foul for they are the deadly enemies of clean food and therefore of health. A free use of turpentine now in edges of windows and any other place where they might have spent the winter will do much. The danger of food contamination from the dog and cat often allowed free range of the kitchen is frequently overlooked. They increase the amount of dust flying about, and tables, utensils and dishes, sometimes come into direct contact with their none too clean hair.

CLEANLINESS IN THE KITCHEN.

Careless washing of dishes, the leaving of milk or bits of food in the crevices of pans or other utensils, or the use of a damp or unclean dish-towel, will render the dishes a good growing place for bacteria. We all know the necessity for absolutely clean milk dishes, and it is no less true that the dishes from which we eat our food should be absolutely germless. We are sometimes surprised to find carelessness in the matter of dish-towels, a fault of otherwise immaculate housekeepers.

A roll of clean grocer's wrapping paper in the kitchen, and a small paint brush, washed after each use, for buttering pans, will do away with the all too common use of old wrapping paper, or any other that happens to be at hand, for lining pans and draining fried foods.

We all, I am sure, sense the desirability of absolute, personal cleanliness on the part of the cook, clean aprons, neatly arranged hair, covered if possible by a cap, clean hands and immaculate finger nails, are only the demands of common decency.

UNSEALED FOODS MUST BE WASHED.

And now as to the food itself. It is safe to say that nearly all foods need some sort of cleaning when they come to us. Too often they have been exposed to dust, flies and the touch of unclean hands. Water being our universal cleanser it is most frequently applied to foods needing to be made clean. Berries should be washed always, in a colander, by allowing cold water to run through. The larger

fruits may be washed and wiped with a cloth. Vegetables should be scrubbed and rinsed clean, cauliflower, lettuce and cabbage, being inverted for some time in water with a little vinegar and salt in it to remove any insects between the leaves. Eggs should be carefully washed and wiped. Meats should be wiped well with a damp cloth, never soaked in a pan of water as this draws out their juices. Cans should always be washed off before the can is opened. In fact everything that is not hermetically sealed when it comes from grocery or market should be subjected to a cleaning process before it comes in contact with our food.

CARE OF THE CELLAR.

But apart from the carelessness of those who handle our food in its production and distribution, there is much waste by the spoiling of food from causes which the housewife can perhaps control by her methods of storage. In farmhouses the great storeroom for food is very often the cellar. To be a perfect storeroom, immune to the growth of molds, yeasts and bacteria, the cellar must be light and dry. Cement is considered the best covering for floor and walls, and whitewash, or dishes of unslaked lime, absorbers of any unavoidable damp. Thorough ventilation of the cellar is necessary. Preserved fruit should be kept where there is plenty of light, for light, you remember, is not conducive to the growth of bacteria. The wrapping of tomatoes, oranges, apples and lemons in soft paper, and placing on airy shelves, will keep them longer undecayed than if they touch one another. The method of keeping cranberries in cold water, that you no doubt have practised, cannot be improved upon. In fact experience has taught us many things about the storing of foods, for which science can explain the reason, but upon which it cannot improve.

CARE OF REFRIGERATORS.

The use of an ice chest or refrigerator for the storage in summer of cooked meats, milk and other perishable supplies, makes use of the principle that low temperatures retard the growth of micro-organisms. The food should not be put directly on the ice, and care should be exercised in the matter of putting fish or highly odored vegetables in the same compartment with other foods, unless the odorous food is tightly covered. Milk, cream and butter are especially easy to contaminate in this way.

The most scrupulous care must be exercised to keep the interior of the refrigerator clean. It should be washed, aired and scalded every two days, and no food showing any signs of decay should be left in it for even a short time. The drain pipe and pan need frequent washings and scaldings with hot water in which some washing soda has been dissolved.

A device sometimes used for the keeping cool of cooked food is a box nailed outside a kitchen window, accessible only from within. Lined with oilcloth it is easy to clean, and will keep surprisingly cool if on the north side of a house.

CHEMICAL PRESERVATIVES.

To sum up the experience and knowledge of housekeeper and scientist, we find that there are three general methods of keeping food from the ravages of yeasts, molds and bacteria.

(1) By treating the food in such a manner that these plants will not flourish in it. The oldest known method of accomplishing this was by drying meats and fruits; a method still widely used. Other foods are smoked or preserved in salt or heavy syrup or with spices, all of these preservatives being unfavorable to the growth of bacteria. Sometimes chemical preservatives are used, such as boracic acid and formalin for milk or fruits, but this is not advisable from the standpoint of digestion, and their use in food factories is illegal in the United States, and should be everywhere. An exception to this is the best known method of keeping eggs, which is the storing of them in a solution of a substance called "Water glass," enough of which to preserve twelve dozen eggs can be bought at the drug store for a very small sum. The effect of low temperatures on food has been spoken of. This is really the most modern means of preservation and is rapidly, in the uses of cold storage, replacing all other methods of keeping meats, fish and fruit. I read recently of one progressive middle western town which built at public expense a cold storage plant where the housewives of the town could have meat or fruit or fish cared for in fairly large quantities, thus enabling them to buy at wholesale or at least reduced prices. It seemed a decided improvement over the waste that ensues from lack of knowledge and poor facilities for storing food in the homes.

HIGH TEMPERATURE.

(2) The second general method of preservation applied to foods, is that of destroying all bacteria or other micro-organisms that may already be in the food. It is a matter of experience to you that fresh meat and fish will keep longer if cooked. How often you have perhaps said "I must cook it to save it," when you knew that it would probably, in the nature of things, be smelling high before long if left raw. The cooking destroys the germs of decay in the meat or fish.

The process of killing micro-organisms by high temperatures is called sterilization. We are familiar with the term in connection with surgical supplies. When foods are canned they are first sterilized. Suspected milk and water are sterilized by boiling, not to preserve them, but to make safe beverages of them. The sterilization of such things as a joint of meat by cooking and of a pot of fruit by boiling, or other large bulk of food, has this disadvantage, that the middle or central part may sometimes be not hot enough during the process to destroy all bacteria. Also to heat milk to the boiling point renders it hard to digest. Pasteurization is the method usually applied to milk used for infants' food. The milk is heated by steam to about 160° F., a temperature usually considered destructive of most disease-producing germs.

CANNING.

(3) The third method of preventing decay of foods is to keep the food protected from dust and flies. All the precautionary measures I

have mentioned and many not mentioned are but modifications of this method. The covering of potted meats with a layer of fat, of jellies with paraffin wax and the Italian way of sealing the necks of wine flasks with a few drops of oil are all effective. Canning food is a combination of the second and third of these general methods. It consists of first sterilizing the food, and then sealing it in such a manner that it will remain sterile. Be sure that the canned goods you use is in perfect condition. If it looks or smells at all unlike the way it should, do not on any account use it. A type of poisoning called ptomaine poisoning sometimes results from eating badly canned or otherwise spoiled food.

The proper storing of food, too, comes under this last heading of protecting the food. I will spare you further detail in that connection. You know that the bread and cake boxes need frequent scalding and airing and sunning, or mustiness, the sure indication of mold, is the result. As to store cupboards and pantries, I wonder how many housekeepers feel that hers are adequate. We should make a study of house plans and read all available literature on the construction and furnishing of a house, and very often, in the magazines and bulletins which have such general distribution now, experienced housewives contribute methods and knowledge which any of us may find new and valuable. My advice to you is to read up this subject of storing and preserving food. It has a scope that many lectures could not cover and I realize that I have but dealt in generalities.

Keep up the good fight begun generations ago between housekeepers on the one side and bacteria on the other, always remembering that it is the fittest which survive in any conflict of living things. Just as soon as you go home begin to "Swat the fly," and don't stop swatting him until it has become a physical impossibility for you to "swat" anything, and may that day be far distant.